6-inch, Sm. does not mention them. I measured them as follows :—

A and B	P = 91°.5	D = 7″.72	1880·19
	90.4	7·97	1880·21
A and C	81·0	14·30	1880·19
	79·6	14·35	1880·21

Notes on a Paper entitled "An Examination of the Double-Star Measures of the Bedford Catalogue," by S. W. Burnham, Esq. By E. B. Knobel, Esq.

The above paper by Mr. Burnham is mainly devoted to an examination of those objects in the Bedford Catalogue designated by the late Admiral Smyth as "stars with comites," of wide double stars, and of stars with faint companions.

Most observers who have bestowed any attention on this class of so-called "double-stars" have noticed discrepancies, in their results, sometimes of considerable amount, compared with the figures given in the "Cycle." My attention was in the first instance drawn to discrepancies in some of the Cycle results, about the year 1867 or 1868, by the Rev. E. Lowe, of Atherstone, who was then engaged in a systematic examination of all the objects in the Bedford Catalogue, with the fine 8¼-inch Alvan Clark Refractor, originally belonging to Mr. Dawes, and which now forms the equatorial telescope of the Temple Observatory at Rugby.* Six years ago I measured several of these objects, and finding that my results differed widely from those in the Cycle, I communicated them to a then member of the council of the Royal Astronomical Society, stating that "I could not but think that Smyth's measures were in error." I was strongly counselled to publish these results, but I did not think them sufficiently numerous to be of much value.

Mr. Burnham's micrometrical measurements are very valuable as correcting the, in many cases, erroneous figures given in the Cycle for the position-angle and distance of these wide objects.

But there are many points connected with Admiral Smyth's observations of these stars which have either escaped Mr. Burnham's notice, or which are contained in publications and MSS. to which he may not have had access.

It is eminently desirable that in investigations of this kind every possible source of information should be carefully consulted, and that, in order to explain discrepancies, we should

* If my memory serves me right, Mr. Lowe's results were inserted in pencil in the margin of his copy of the Bedford catalogue which, I believe, is now at the Rugby Observatory.

endeavour to seek for a clue to them in the author's own writings, or in his known mode and means of observation, rather than in a hypothesis which may not be substantiated by anything therein contained.

The classification by Mr. Burnham of the stars into two groups, of 1. "Double stars accurately measured by Struve, Sir William Herschel, South, and others, before the epoch of Smyth;" and 2. "Double stars and stars with distant companions, which had not been carefully measured by any other observer up to the time of the publication of the Cycle," is more arbitrary than natural, and rather prejudges the whole question, especially as so little evidence is offered in support of the statements with regard to Class I.

The objects in Class II. consist almost entirely of stars with distant or faint companions which were inserted in the Bedford Catalogue for various reasons: either the star had a history, or it had been observed for a special purpose, or it was near something else, or it possessed some peculiarity in name which afforded the author an opportunity of discussing the oriental history of it, or it was a Greenwich star, or a companion was given to the star as a means of future identification, or "the angle and distance of an eligible companion was marked for the purpose of watching the motions of the larger component with an expected heliometer; as this was but a preparation, they are only registered on the lowest weight." *

The objects selected by Mr. Burnham and placed in Class II. when examined with reference to the printed Bedford Catalogue and the MSS. in Admiral Smyth's writing belonging to the Royal Astronomical Society, may be thus summarised:—

They comprise 150 of the celestial objects in the Cycle.

Of these, 79 are titled by Admiral Smyth "stars and comites;" 80 of the objects do not appear to have been micrometrically examined at all, the distance of the components is stated to have been simply estimated, or determined by Δ A.R. (equivalent to an estimation).† In this connection it is most important to take into consideration the weights assigned by Admiral Smyth to the observations discussed by Mr. Burnham. The 150 selected objects comprise 180 determinations of the position and distance of the components. Of these 180 distances, 148 have weight 1 assigned to them, 21 have weight 2, and 11 have higher weights. For the position-angles, 96 have weight 1, 52 have weight 2, and 32 higher weights.

As 82 per cent. of the distances have weight 1 assigned to them, we have first to enquire what value was attached by the

* *Cycle*, vol. i. p. 430.

† "Distance is a mere estimation by Δ A.R. over a small bar in the eyepiece expressly fitted for such cases."—*Cycle*, vol. ii. p. 462.

"The position and distance of the nearest of these was obtained by estimations made in a dark field for the angle and the Δ A.R. by a bar for the distance."—*Cycle*, p. 446.

author to such a weight. The answer is sufficiently clear. In Cycle, vol. i. p. 426, Admiral Smyth states that he has subjoined to the measurements of position and distance "weights of the comparative value of the observations in numbers from one to ten, *the first representing nearly worthlessness*, and the latter perfection." The paragraph already quoted * shows a class of observations to which weight 1 was attached. In vol. i. p. 428 Admiral Smyth writes, "The extremely faint objects were *estimated* either by an annular micrometer or a vertical bar which I had fitted to an excellent eyepiece with a small hole in its centre." Many of these extremely faint objects are included in Mr. Burnham's selections, and they have all weight 1 attached to them. In "Speculum Hartwellianum," p. 229, he says—"In the Cycle there is a slight typographical error in the distance of C—namely, instead of 15″·1 it should have been 15″·0, *as the trifling sum of weight* (W. 1) *would indicate*." And at p. 260 he says:—"The distances are *mere guesses to which my lowest weights* (W. 1) *are applied*, but perhaps 0 ought to have been introduced into my scale." Should any further doubt exist as to what value Admiral Smyth attached to an observation with weight 1 appended, it is certainly decided in vol. ii. p. 453, where he says, "And it should be remembered that such mere points of light were scrutinised to prove the power of the instrument for its general work, rather than to establish data for an epoch by estimation only. *Thus the mark* (*w* 1) *serves only to show that the object was identified*." † These words are most clear and explicit, and though it is undoubtedly and unfortunately true that subsequent observers have taken every figure in the Cycle as the result of careful micrometrical measurement, they have done so without considering, and in spite of, the author's distinct statements to the contrary.

It remains to consider how it happens that whereas 82 per cent. of the Distances have W. 1 attached, only 53 per cent. of the position angles have that low weight.

The micrometrical means of Admiral Smyth consisted not only of the Parallel Wire Micrometer described by Mr. Burnham, but also of what are more pertinent to the observations under discussion, of the Annular Micrometer for estimating distances of faint objects,‡ the bar micrometer "expressly fitted" for estimating distances by Δ A.R.§ and the Spherical Crystal Micrometer, which he found "excellent for ascertaining the position of objects too faint for illumination." ‖ The annular micrometer consisted of a steel ring inserted in a disc of glass, the radius of the ring being 472·5 seconds of arc.¶ The Spherical Crystal Micrometer was a very favourite instrument with Admiral Smyth, and the principles of its construction are described

* *Cycle*, vol. i. p. 430.

† For a further explanation of this value, see notes to η Herculis appended.

‡ *Cycle*, vol. i. p. 428.

§ *Cycle*, vol. ii. pp. 446, 462.

‖ *Cycle*, vol. i. pp. 339, 428.

¶ *Cycle*, vol. i. pp. 339, 385.

in the references above given. His original instrument is in the possession of the Astronomer Royal, who has most kindly lent it to me for the purpose of this enquiry, and to endeavour to throw light upon the following quotations from the Smyth MSS. of the Cycle belonging to the Royal Astronomical Society :—

ζ Ceti. "By spherical crystal. Pos. 139° 24′ from 180° = 40° 26′" (this is a clerical error for 40° 36′).

δ Persei. "By rock crystal. Pos. 224° 40′ − 90° = 315° 0′" (this evidently should be + 90°).

δ Canis Majoris. "By spherical crystal = 314°·0′ − 90° = 224° 0′."

61 Virginis. "Crystal at $\begin{array}{r} 160^\circ\ 35' \\ 180 \\ \hline 340^\circ\ 35' \end{array}$" (180° + 160° 35′).

1 Piscium. "Pos. = 140° 30′ = 39° 30′" (evidently 180° − 140° 30′).

These quotations indicate that the reading had to be added to or subtracted from 90° or 180°, and hence a fruitful source of error.

For the range of this micrometer I find that the spherical crystal revolves through an arc having 45 divisions on each side of zero. The value of one division according to Admiral Smyth (Cycle, vol. i. p. 339) = 0″·27, consequently 12″·15 was the greatest possible distance that could be measured with it on his telescope.

A toothed circle graduated from 0° to 360° is fitted to the micrometer, round which the spherical crystal can be made to revolve. Against the 360° graduation there is a small projecting piece of brass, which evidently served for the purpose of inserting the instrument in the draw tube of the telescope in a definite position with regard to the meridian. It is apparently very doubtful how accurately this circle could be adjusted for measuring position-angles, and it is probable, from the absence of any wire or fiducial line for determining accurately the north and south points of the field, that such adjustment was uncertain.

As this micrometer afforded Admiral Smyth a far more reliable instrument for measuring the position-angles of faint objects than he had for their distances, so we find that the average weight he has given to such position-angles are higher than to distances.

I have investigated in a brief manner, but as carefully as the limited time at my disposal would allow, the employment of the Spherical Crystal Micrometer for determining position-angles. For this purpose I have arranged some artificial wide double stars at definite position-angles, and at distances ranging from 10 to 210 seconds of arc. The position-angles were measured exactly after Admiral Smyth's method, by pointing the double image of A in the direction of B.

As the axis of the spherical crystal can be revolved freely

round the circle in either direction without any stop, the result is that we may obtain *two* readings for every position-angle.

The following table of the micrometer readings corresponding to a series of position-angles may be of interest.

Position-Angles.		Micrometer Readings.	Position-Angles.		Micrometer Readings.
0° or 360°	=	360° or 180°	180°	=	180° or 0°
15	=	345 „ 165	195	=	165 „ 345
30	=	330 „ 150	210	=	150 „ 330
45	=	315 „ 135	225	=	135 „ 315
60	=	300 „ 120	240	=	120 „ 300
75	=	285 „ 105	255	=	105 „ 285
90	=	270 „ 90	270	=	90 „ 270
105	=	255 „ 75	285	=	75 „ 255
120	=	240 „ 60	300	=	60 „ 240
135	=	225 „ 45	315	=	45 „ 225
150	=	210 „ 30	330	=	30 „ 210
165	=	195 „ 15	345	=	15 „ 195

From this we gather the following mode of reducing the readings. Stars in north following and south following quadrants—

Position-angle = 360° − mic. reading,
or 180° − mic. reading.

Stars in north preceding or south preceding quadrants—

Position-angle = 360° − mic. reading,
or 180° + (360° − mic. reading).

The first thing that strikes one is the very great liability to error in observations of positions with this instrument, and knowing how freely it was used by Admiral Smyth, it is enough from distinct instances and inferentially to account for a large number of discrepancies. The quotation already given with regard to ζ Ceti reveals a clerical error in the reduction. With δ Persei the correction to the reading is given as −90° instead of +90°. As this position is *np*, Admiral Smyth's correction of +90° is in error, though taking the reading as 225° the result is the same.

δ Canis Majoris. "By spherical crystal = 314°·0 − 90° = 224°·0."

This is clearly in error. Reading 314° for a star which is *sp.* corresponds to a position of 226°·0 = 180° + (360 − 314°) = 226°.

61 Virginis. The R.A.S. MS. gives "Crystal at 160° 35′
180°
340° 35′"

It will be seen that the only possible position-angles where 180° can be properly *added* to the reading are 270° and 360°. From the table I have given we at once see that a circle reading of 160° 35′ must correspond to position-angles of either 19° 25′ or 199° 25′, and as the companion of 61 Virginis was obviously neither *sp* nor *sf*, the correct position angle of the Cycle is 19° 25′. Under no circumstances could a reading of 160° 35′ place the star in the *np* quadrant. Admiral Smyth has given the sum of 180° and the Micrometer reading, instead of the difference. This affords a satisfactory explanation of the discrepancy Mr. Burnham finds in the measures of this star. Further explanations of probably similar errors are offered in the subjoined notes to the following stars: χ Persei, γ Persei, 41 Sextantis, λ Herculis.

Mr. Burnham remarks upon the Cycle observations of the magnitudes and colours of small stars, which he says "are, to say the least, of very questionable accuracy in many instances." The following evidence with regard to colours is adduced in support of that statement.

52 Piscium. "The companion (14 m) is called 'deep blue.'"

76 M Persei. "The small star is described as 'dusky.'"

55 Andromedæ. "Smyth says the small star 'was only caught by intense attention' *and yet* calls it 'bluish.'"

53 Virginis. "Smyth called the small star (15 m) 'bluish.'"

72 Virginis. "Smyth does not seem to have been aware that this was one of the Struve stars and only refers to its being registered by ℍ but without measures. *And yet* the small star, which is only 11·5 of Σ's scale, was well enough seen to be described in the *Cycle* as 'violet tint.'"

163 P. XIII. "This faint star is called 'ash coloured' by Smyth."

α Boötis. "Very distant," called "lilac" by Smyth.

95 P. XIV. "This is described as 'a truly difficult object,' and best seen on averting the eye, *but called* 'bluish.'"

ε Ursæ Minoris. "The companion called 'pale blue.'"

η Cephei. "The companion is called 'dusky.'"

χ Delphini. "The small star is said to be 'pale lilac.'"

α Cephei. "The small star is described as 'pale sapphire.'"

312 P. XXI. "Smyth, who could see B only, calls it 'blue.'"

κ Andromedæ. "The small stars are called 'dusky' and 'ash coloured.'"

It is well known that Admiral Smyth devoted a great deal of attention to the colours of double stars; throughout the Bedford Catalogue no star is mentioned without some colour being given to it. In the "Speculum Hartwellianum" a whole chapter is devoted to the subject. This was subsequently reprinted with additions to form Smyth's tract on "Sidereal

Chromatics." In the preface to this tract (p. vi.) Smyth refers to the "Fancy Colours" he had given in the Bedford Catalogue, which he explains. His words are, "I will here cite a sample from my own practice, placing the *inexact epithets* which I have used in Roman print, and what was probably meant is expressed in Italics." Among the "inexact epithets" are found the above terms, "dusky,"* "ash-coloured," "lilac," and "sapphire," all of which are explained.

In his note to the star 55 *Andromedæ*, Mr. Burnham has omitted the important remark of Admiral Smyth with reference to the colour. He says ("Cycle," vol. ii. p. 43), "Is the intense blue which some of these mere points of light present an optical illusion?"

In "Cycle," vol. i. p. 302, and "Sidereal Chromatics," p. 15, Smyth says, "I have been much struck with the beautiful blue tint of several of the smallest stars visible in my telescope. This, however, may be attributed to some optical peculiarity." Again, in "Cycle," vol. ii. p. 290, he says, "B 15, intense blue; this last colour on so small an object is very striking, and an astronomical friend who examined it at my request with powerful means confirms both the tint and its intensity." In vol. ii. p. 115, he says:—"Σ. discovered the delicate companion C which had escaped the gaze of all other observers, and requires the most careful attention even to be perceived by occasional glimpses, but when seen, has a peculiar deep purple tint which strikes singularly on the eye from so excessively minute an object." In "Cycle," vol. ii. p. 522, he remarks that Sir John Herschel observes that a certain minute star "bears illumination well and is *therefore* blue." Mr. Proctor, in his "Orbs Around Us," p. 322, says, "The late Admiral Smyth, who thought he could recognise very decided blue tints among the minuter stars, expressed a doubt whether this might not be due to some idiosyncracy of his eyesight." And in their recently published "Manual of Astronomy," p. 452, Professor Newcomb and Professor Holden say that certain phenomena "are partly due to the physiological fact that *the fainter a star is the more blue it will appear to the eye.*" †

These quotations show that Admiral Smyth was perfectly well aware of the apparent anomaly in recording decided colours to minute points of light; and the important fact, stated by Professor Newcomb and Professor Holden in their "Astronomy," proves that such observations, as have been called in question by Mr. Burnham, were made by an eye very sensitive to colour, and are probably accurate.

In an interesting "Note on a Relation between the Colours and Magnitudes of the Components of Binary Stars" published in the *American Journal of Science*, June 1880, my friend Prof.

* "C is of the nondescript tint called 'dusky.'"—*Spec. Hart.* p. 265.

† "While the last gleamings of refracted light
Died in the fainting violet away."
Thomson, *Poem to the Memory of Sir Isaac Newton.*

Edward S. Holden says :—" We do not find *isolated* stars of decided green, blue, or purple colours. A few such have been recorded, but in most cases erroneously." To which a note is appended :—" For example, Admiral Smyth calls *α Lyræ* a *green* star." Admiral Smyth remarks in "Sidereal Chromatics," p. 17 : —" There is not an instance of a solitary green, purple, blue, or violet star being found." In the Bedford Catalogue, p. 423, and "Sidereal Chromatics," p. 33, the colour of *α Lyræ* is given "pale sapphire;" and in the preface to "Sidereal Chromatics," p. vii., the word "pale" is stated to mean "deficient in hue," and the word "sapphire" to mean "blue tint." I have entirely failed in finding any reference to *α Lyræ* as a "green" star.

With regard to the stars under discussion a few conclusions may be safely drawn from the internal evidence afforded by Admiral Smyth's writings, independent of the proofs given by more recent micrometrical measurements. Firstly, nearly all these stars, and those with W. 1 attached, were never intended by Admiral Smyth to be considered as accurately micrometrically measured. The difficulties and misapprehensions that have arisen are entirely due to the improper manner in which such observations are printed with a decimal point and a cypher, and with a certain weight appended. It is plain on the face of it that observations of distances of one or two hundred seconds of arc in round numbers, without tenths or hundredths, cannot be the result of accurate micrometrical measurements. Secondly, the instrumental means of Admiral Smyth for these stars were not calculated to yield accurate results. The uncertainty and difficulty in using the spherical crystal micrometer is sufficiently demonstrated in the remarks I have made. The annular micrometer, used for estimating distances, consisted of a ring with a *radius* of $472''.5$, and it needs no further remark to show that estimations with such an instrument must be of the vaguest kind. And thirdly, we see by the quotations from the R. A. S. MSS. that Admiral Smyth was careless in his arithmetical reductions, and from the note to *β Aquarii* we perceive that his judgment in estimating distances was unsound.

The following notes on the stars speak for themselves in affording additional information and explanation of the results discussed by Mr. Burnham.

Additional Notes to Stars in Mr. Burnham's Class II.

β Cassiopeæ (p. 2).

Pos. W. 1. Dist. W. 1.

Smyth says :—" A bright star whose acolyte is so small that it is here rather *estimated* than measured." R. A. S. MS. gives distance "Δ A.R. $19^s.1 = 201''.0$."

147 H III. (p. 3).

Pos. W. 1. Dist. W. 1.

Apart from W. 1 being attached to each element, Smyth particularly mentions that this double star "is here *estimated.*" The object is evidently inserted in the "Cycle" because it occupied the spot where Smyth sought for H's faint nebula, and it serves merely to introduce some remarks upon H's idea of nebulous fluid.

γ *Pegasi* (p. 5).

Pos. W. 1. Dist. W. 1.

The R. A. S. MS. gives the distance as "181″·0 or 182″·0."

ι *Ceti* (p. 6).

Pos. W. 1. Dist. W. 1.

Smyth expressly states:—"This is an excessively difficult object, being only discernible after long attention, and by occasionally averting the eye to another part of the field of view. The position and distance are therefore only the result of cautious *estimation.*"

12 *Ceti* (p. 8).

AB. Pos. W. 1. Dist. W. 1.

AC. Pos. W. 2. Dist. W. 1.

Smyth calls it "a most difficult test object." "B is only discernible by the closest attention under favouring circumstances, though when once caught is tolerably well seen; the detail here given is therefore a *mere estimation.*"

52 *Piscium* (p. 10).

Pos. W. 1. Dist. W. 1.

Smyth calls it "a most delicate object whose position and distance are carefully ["cautiously" in R. A. S. MS.] *estimated.*"

δ *Andromedæ* (p. 11).

Pos. W. 2. Dist. W. 2.

α *Cassiopeæ* (p. 12).

Pos. W. 3. Dist. W. 3.

Smyth quotes H's measure and says:—"Which compared with mine does not show a greater difference of angle than might be expected from the proper motion of an object whose proximity is accidental, but the difference in distance is so remarkable, that it must be imputed to instrumental error." With regard to the

above remark Smyth adds in "Speculum Hartwellianum," p. 217: —"Meaning of course to impugn H's 56″·17 of fifty years before, but it turned out instead to be a gross blunder of my own, only explicable on the supposition of counting a wrong revolution with the comb out of the field with the power used."

P. O. 146 (p. 14).

Pos. W. 3. Dist. W. 1.

H. 1046 (p. 17).

Pos. W. 1. Dist. W. 1.

The "Cycle" says:—"The double star here carefully *estimated.*"

σ^2 *Piscium* (p. 24).

AB. Pos. W. 4. Dist. W. 2.

AC. Pos. W. 3. Dist. W. 1.

Mr. Burnham says:—"Smyth has *the extraordinary conclusion* that 'an inference of binarity is deducible from a comparison of the registered epochs of H and himself,' whereas Smyth commences the sentence by saying '*No safe conclusion* can be deduced from the discrepancies observable in the position of A and B, as the object is most delicate.'"

R. A. S. MS. says:—"I requested Mr. Challis to make a diagram with the large telescope. His diagram confirms mine."

η *Ceti* (p. 27).

Pos. W. 1. Dist. W. 1.

β *Andromedæ* (p. 27).

Pos. W. 1. Dist. W. 1.

The star which Mr. Burnham calls D is clearly Smyth's companion. In the R. A. S. MS. the distance is given "Δ A.R. 8ˢ· 8 W. 1, Pos. 299·0 W. 1." The reduction of these elements gives 124″ or 125″ as the distance. The discrepancy is most probably a printer's error of 225 for 125.

H. 634 (p. 31).

Pos. W. 1. Dist. W. 1.

Smyth states that the position and distance are "*mere estimations.*" They differ much from H.

42 H VII. (p. 33).

Pos. W. 1. Dist. W. 1.

The R. A. S. MS. says:—"The position and distance of which are carefully *estimated.*"

40 *Cassiopeæ* (p. 37).
Pos. W. 2. Dist. W. 1.

"A delicate object."

76 *M. Persei* (p. 40).
Pos. W. 1. Dist. W. 1.

R. A. S. MS. says:—"The wide double star *estimated*."

107 *Piscium* (p. 41).
Pos. W. 2. Dist. W. 1.

Smyth says:—"The comes is so minute that light is inadmissible, the position is therefore gained by the spherical crystal micrometer, and the distance carefully *estimated*."

ζ *Ceti* (p. 43).
Pos. W. 3. Dist. W. 1.

R. A. S. MS. states:—"By annular micrometer nearly the same as wire. By spherical crystal Pos. 139° 24′ from 180°. Δ A.R. $7^{s}\cdot8$."

At the bottom Pos. is given =40° 26′—a clerical error for 40° 36′. The distance is clearly computed from Δ A.R.

55 *Andromedæ* (p. 43).
Pos. W. 1. Dist. W. 1.

The small star was Smyth's minimum visibile; "its position and distance are therefore only *estimated*."

α *Trianguli* (p. 44).
Pos. W. 1. Dist. W. 1.

P. I. 222 (p. 47).
AD. Pos. W. 2. Dist. W. 2.

"This group is most difficult to observe, and the results are rather *estimations* than measures."

P. I. 227 (p. 48).
Pos. W. 5. Dist. W. 3.

χ *Persei* (p. 57).
AB. Pos. W. 2. Dist. W. 1.
AC. Pos. W. 5. Dist. W. 3.

Admiral Smyth's position-angle of AC is 43°·2, whereas Mr. Burnham makes it 136°·3 and remarks :—"It is not easy to see how Smyth could make such an error in his own observation, as there is no such mistake found anywhere else in the work." Smyth gives his observation of position W. 5, showing that he considered it had been made with care. A little consideration of the remarks upon the spherical crystal micrometer will show that 43°·2 is the *exact reading* of that instrument corresponding to a position-angle of 136°·8 thus : 180° − 43°·2 = 136°·8. It is most probable here that Smyth has given the reading of the circle without correction.

34 *M. Persei* (p. 66).

Pos. W. 2. Dist. W. 2.

The R. A. S. MS. says, "a double star *about* 15″ apart."

θ *Persei* (p. 67).

Pos. W. 1. Dist. W. 1.

γ^1 *Fornacis* (p. 72).

Pos. W. 2. Dist. W. 1.

Cycle says :—"As B vanishes under illumination its position is taken by the spherical rock-crystal micrometer, and the distance *estimated*."

γ *Persei* (p. 75).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says :—"May be made triple with C, but only measured H's, and that very slightly, for the evening was bad, and the object wide and unequal."

Smyth's position-angle is 226°·8. Mr. Burnham makes it 323°·9. It is probable that Smyth has given the reading of the spherical crystal micrometer without correction. The details of this instrument already given show that 226°·0 corresponds to a position-angle of 314°, which would be fairly satisfactory for a very slight measurement.

β *Persei* (p. 77).

Pos. W. 2. Dist. W. 1.

R. A. S. MS. has :—"The effulgence of the large star interferes with measures for distance."

52 *Arietis* (p. 77).

AD. Pos. W. 1. Dist. W. 1.

Smyth says :—"The whole [quadruple group] are of most

difficult measurement . . . the details of the latter two (C and D) being of course *mere estimations*."

τ^4 *Eridani* (p. 79).

Pos. W. 1. Dist. W. 1.

α *Persei* (p. 80).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says:—"A is so brilliant as to render measures difficult, they are *mere estimations*."

δ *Persei* (p. 82).

Pos. W. 2. Dist. W. 1.

R. A. S. MS. says:—"By rock crystal Pos. 224° 40′ − 90° =315°·0" (this should be +90°). "Dist. Δ A.R. $7^s{\cdot}0$."

The reduction of the Δ A.R. differs only 3″ from Mr. Burnham's measure; a probable error by Smyth in reducing his observation.

19 *Pleiadum* (p. 84).

Pos. W. 2. Dis. W. 1.

P. IV. 257 (p. 108).

AC. Pos. W. 2. Dist. W. 2.

R. A. S. MS. says:—"Δ A.R. AC=$4^s{\cdot}3$."

66 *Eridani* (p. 111).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. has for distance "Δ A.R.=$0^s{\cdot}4$."

β *Eridani* (p. 111).

Pos. W. 2. Dist. W. 1.

R. A. S. MS. has for distance "Δ A.R.=$4^s{\cdot}2$."

H. 3269 (p. 112).

Pos. W. 2. Dist. W. 2.

H. 3272 (p. 118).

Pos. W. 1. Dist. W. 1.

γ *Orionis* (p. 121).

Pos. W. 3. Dist. W. 2.

R. A. S. MS. has for distance "Δ A.R. $3^s{\cdot}6$."

109 *P. Orionis* (p. 124).

Pos. W. 1. Dist. W. 1.

β *Leporis* (p. 125).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. has for distance "Δ A.R. $13^{s}{\cdot}1$."

Mr. Burnham says :—"There are two 10 mag. stars in this quadrant." The R. A. S. MS. diagram shows both these stars.

ε *Orionis* (p. 134).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. has for distance "Δ A.R. $9^{s}{\cdot}8$."

124 *Tauri* (p. 135).

BC.	Pos. W. 7.	Dist. W. 3.
AB.	,, W. 1.	,, W. 1.
AD.	,, W. 1.	,, W. 1.

In the R. A. S. MS. it is evident that BC was measured, but AB and AD were only arrived at by Δ A.R. The MS. gives "Δ A.R. A and B$=5^{s}{\cdot}5$, Δ A.R. A and D$=1^{s}{\cdot}0$."

ν *Aurigæ* (p. 139).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says :—"*Mere estimations.*"

78 *M. Orionis* (p. 138).

Pos. W. 2. Dist. W. 1.

37 *M. Aurigae* (p. 140).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says :—"It is preceded by the double star here measured *or rather estimated.*"

β *Aurigae* (p. 143).

Pos. W. 2. Dist. W. 2.

With regard to the measure by Challis given by Mr. Burnham, the R. A. S. MS. has :—"I requested Mr. Challis to look to it (print his results)."

θ *Aurigae* (p. 143).

Pos. W. 2. Dist. W. 1.

35 *Camelopardi* (p. 144).

Pos. W. 2. Dist. W. 1.

5 *Lyncis* (p. 148).

AB. Pos. W. 1. Dist. W. 1.
AC. „ W. 7. „ W. 2.

R. A. S. MS. says:—"A and C are the stars which constitute H VI. B seems not to have been seen till Σ announced it. It is seen readily in the spherical crystal micrometer, illumination being impracticable."

μ *Geminorum* (p. 148).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. gives distance "Δ A.R. $5^s{\cdot}4$."

ζ *Canis Majoris* (p. 149).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. gives distance "Δ A.R. $6^s{\cdot}7$," and says:—"Piazzi's 80 and 81 Hora VI. by whose observations reduced they would be for 1800 Pos. 337°·0. Dist. 178·0." "

It is worthy of notice that though Piazzi's reduced observations agree with Mr. Burnham's results, and were evidently very good, Admiral Smyth does not appear to have made his agree with them.

β *Canis Majoris* (p. 150).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. gives distance "Δ. A.R. $4^s{\cdot}7$."

10 *Monocerotis* (p. 151).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. diagram shows that Mr. Burnham's B is the star measured, as C is also given.

γ *Geminorum* (p. 154).

AB. Pos. W. 1. Dist. W. 1.
AC. „ W. 1. „ W. 1.

The Cycle gives the distance as $75^s{\cdot}0$ and $110^s{\cdot}0$, as if seconds of time, and says:—"Followed nearly on the parallel Δ A.R. 40^s by a neat 9 mag. star." We may fairly presume that the distances AB and AC were determined by Δ A.R.

α *Canis Majoris* (p. 158).

Pos. W. 1. Dist. W. 1.

H. 740 (p. 165).

Pos. W. 2. Dist. W. 1.

ζ Geminorum (p. 169).

AB. Pos. W. 4. Dist. W. 2.
AC. „ W. 1. „ W. 1.

R. A. S. MS. says "Distance Δ A.R. A and B=1ˢ·8. Δ A.R. A and C=5ˢ·0."

δ Canis Majoris (p. 170).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says "Angle by spherical crystal=314°·0−90°. Distance=Δ A.R.=13ˢ·5."

The reading of 314°·0 on the spherical crystal micrometer corresponds to a position of 226°, not 224° as given by Smyth.

30 *Canis Majoris* (p. 174).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says:—"Distance = Δ A.R. 5ˢ·6=85″·0. A bright white star in a rich cluster of small ones, and with its comes very splendid among the star dust." The two near companions mentioned by Mr. Burnham are probably included in the "star dust."

η Canis Majoris (p. 175).

Pos. W. 2. Dist. W. 1.

R. A. S. MS. gives distance "Δ A.R.=13ˢ·4."

β Canis Minoris (p. 176).

AB. Pos. W. 2. Dist. W. 1.
AC. „ W. 2. „ W. 1.

R. A. S. MS. says:—"See Baron de Zach in vol. xii."

H. 2435 (p. 195).

Pos. W. 4. Dist. W. 1.

P. VIII. 81 (p. 197).

Pos. W. 2. Dist. W. 1.

It is to be remarked that Smyth does not agree with the earlier measure of Struve.

θ Cancri (p. 198).

Pos. W. 3. Dist. W. 1.

ψ Leonis (p. 220).

Pos. W. 2. Dist. W. 1.

41 *Sextantis* (p. 234).

AB. Pos. W. 1. Dist.

AC. „ W. 2. „ W. 1.

Smyth says:—"The *estimated* angle and distance (AB) are next to *mere guesses*." R. A. S. MS. says:—"Mere estimations." A and C. Pos. 120°·4 W. 2. Mr. Burnham gives it 72°·5. The remarks on the spherical crystal micrometer show that we must be prepared for numerous mistakes in readings and their reduction. If the above position-angle 120°·4 be really the reading of that micrometer it represents a true position-angle of 59°·6, which is close enough for a mere guess.

β *Ursæ Majoris* (p. 237).

Pos. 172°·6 W. 2. Dist. 75·0 W. 1.

R. A. S. MS. says the star is *np*, but the position makes it *nf*. The diagram in the MS. shows the companion about 272°, and at a much greater distance than 75″·0. I am, however, inclined to think that the diagrams in the MS. have been made from the recorded observations, and are not eye-sketches.

δ *Leonis* (p. 244).

Pos. W. 1. Dist. Δ A.R. 4ˢ·9 W. 1.

δ *Crateris* (p. 248).

Pos. W. 1. Dist. Δ A.R. 19ˢ·8 W. 1.

δ *Ursæ Majoris* (p. 262).

Pos. W. 2. Dist. Δ A.R. 20ˢ·4 W. 1.

8 *Can. Ven.* (p. 272).

Pos. W. 1. Dist. W. 1.

β *Corvi* (p. 271).

Pos. W. 1. Dist. W. 1.

Smyth says:—"Position and distance here *estimated*."

δ *Virginis* (p. 286).

Pos. W. 2. Dist. Δ A.R. 5ˢ·8 W. 2.

R. A. S. MS. has "Δ A.R. W. 1."

ϵ *Virginis* (p. 290).

Pos. W. 4. Dist. W. 2.

R. A. S. MS. says:—"A star with a very minute distant comes."

53 *Virginis* (p. 292).

Pos. W. 1. Dist. W. 1.

Smyth says:—"As I could only catch a sight of B by gleams with the equatorial clock driving the telescope, the above results are but *estimations*."

61 *Virginis* (p. 294).

ℍ	Pos. 345°	Dist. 73″·25.
Smyth	„ 340°·6 W. 2.	Δ A.R.. 2ˢ·8 W. 1.
β	„ 24°·8	189″·26.

R. A. S. MS. has in pencil in Smyth's writing:—Chrys. 160° 35′ W. 2;" then below—

"
$$= \begin{array}{r} 160^\circ\ 35' \\ 180 \\ \hline 340\ 35 \end{array}$$
"

and at bottom "=340°·6."

This discrepancy has been explained in remarks on the spherical crystal micrometer. Mr. Burnham, who has perhaps viewed the above figures under the aspect of a preconceived theory, says:—"There is a large error in the *repetition of* ℍ's *angle* by Smyth." The correct reduction here is 180° − 160° 35′ = 19° 25′.

α *Virginis* (p. 296).

Pos. W. 2. Dist. Δ A.R. = 19ˢ·4 W. 2.

μ *Hydræ* (p. 300).

Pos. W. 2. Dist. W. 2.

72 *Virginis* (p. 301).

Pos. W. 3. Dist. W. 1.

R. A. S. MS. says:—"Measures of distance out of the question with my means; it is therefore a *mere estimation*."

75 *Virginis* (p. 303).

Pos. W. 1. Dist. W. 1.

Cycle says:—"This object was merely looked at from being among ℍ's sweeps, otherwise it is too difficult to measure and *too wide for tolerable estimation*."

163 *P.* XIII. *Can. Ven.* (p. 306).

Pos. W. 2. Dist. W. 2.

Cycle says :—"This was selected for a trial of the spherical crystal micrometer on the angle of position by getting the double image of A in a line towards B. The distance, being too great for the value of the scale, was obtained by Δ A.R."

R. A. S. MS. says nothing about Δ A.R. but gives for distance "68°·0 W. 2. 70·0 est."

171 *P.* XIII. *Virginis* (p. 308).
Pos. W. 4. Dist. W. 2.

R. A. S. MS. says :—"Though the companion is so minute, it bears the red illumination pretty fairly. Seen well with the rock-crystal prism."

85 *Virginis* (p. 309).
Pos. W. 1. Dist. W. 1.

Cycle says :—"This most difficult object was merely examined from being one of Herschel's sweeps. It is the *minimum visibile* of my telescope, and therefore impossible to measure."

η *Bootis* (p. 311).
Pos. W. 4. Dist. W. 2.

τ *Virginis* (p. 312).
Pos. W. 5. Dist. W. 3.

α *Bootis* (p. 315).
Pos. W. 2. Dist. W. 1.

Cycle gives for distance Δ A.R. $15^{s}\cdot1$. W. 1.
The R. A. S. MS. appends "$=298''\cdot0$."

P. XIV. 95 (p. 322).
Pos. W. 2. Dist. W. 1.

Smyth says :—"The position was approximated by the spherical rock-crystal micrometer, but the distance being too wide for its range it was *merely estimated.*" R. A. S. MS. gives distance "$=40''\pm$ est."

5 *Ursæ Minoris* (p. 323).
Pos. W. 2. Dist. W. 1.

β *Ursæ Minoris* (p. 330).
Pos. W. 1. Dist. W. 1.

δ *Bootis* (p. 338).
Pos. W. 1. Dist. W. 1.

R. A. S. MS. gives distance "Δ A.R. $7''\cdot9$."

ι *Draconis* (p. 344).

Pos. W. 2. Dist. W. 1.

α *Serpentis* (p. 348).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. has, "excessively difficult; *merely estimated.*"

ζ *Ursæ Minoris* (p. 351).

Pos. W. 2. Dist. W. 1.

δ *Ophiuchi* (p. 356).

Pos. W. 1. Dist. W. 1.

υ *Coronæ* (p. 358).

AB.	Pos. W. 6.	Dist. W. 4.
AC.	,, W. 8.	,, W. 5.
BD.	,, W. 2.	,, W. 1.

R. A. S. MS. says:—"Bears illumination badly."

ν^2 *Coronæ* (p. 362).

Pos. W. 1. Dist. W. 1.

η *Draconis* (p. 365).

Pos. W. 1. Dist. W. 1.

β *Herculis* (p. 366).

Pos. W. 2. Dist. W. 1.

η *Herculis* (p. 372).

AC.	Pos. W. 2.	Dist. W. 1.
AB.	,, W. 1.	,, W. 1.

Cycle says:—"Tolerable estimations of an egg-shaped object.' R. A. S. MS. gives AC distance ="Δ A.R. $9^s.5$."

Mr. Burnham says:—"At one time Σ suspected the large star to be a close pair, but afterwards rejected it as single. Of the correctness of this conclusion there has never been any doubt. Smyth measured the angle and distance in 1842." Mr. Burnham has ignored the explanation given by Smyth in *Speculum Hartwellianum* on this subject. He says (p. 275), with regard to AB.:—"This first-class specimen of Σ's Vicinissimæ was gazed at in 1842 till an impression arose that it was slightly elongated, but un-notchable, and therefore under half a second in distance, *but the weights assigned show that the idea was vague, and the conclusions worth next to nothing.*"

η *Ophiuchi* (p. 379).

Pos. W. 1. Dist. W. 1.

36 *Ophiuchi* (p. 381).

AC. Pos. W. 4. Dist. W. 2.

ϵ *Ursæ Minoris* (p. 381).

Pos. W. 1. Dist. W. 1.

λ *Herculis* (p. 390).

Cycle Pos. = 295°·0 W. 1. Dist. Δ A.R. $23^s{\cdot}4$ W. 1.

β ,, = 251°·8

Smyth's position makes B *np*, but in R. A. S. MS. it is given *sp*, where Mr. Burnham proves the star to be. We may surmise that this is another case where the reading of the spherical crystal micrometer has been inserted without reduction. 295°·0 would correspond to a position-angle of 245°·0.

γ *Draconis* (p. 400).

Pos. W. 1. Dist. Δ A.R. $9^s{\cdot}7$ W. 1.

τ *Ophiuchi* (p. 402).

Pos. AC. { W. 2. / W. 3. } Dist. { W. 1. / W. 2. }

Smyth says he made a hopeless scrutiny of AB, and "making nothing of it, I noted the star C *as a future reference.*"

18 M. *Clyp. Sobieski* (p. 415).

Pos. W. 1. Dist. W. 1.

Smyth has probably given the position-angle BA instead of AB.

H. 2002 (p. 414).

Pos. W. 1. Dist. W. 1.

χ *Draconis* (p. 421).

Pos. W. 1. Dist. Δ A.R. $14^s{\cdot}6$ W. 1.

2 *Aquilæ* (p. 426).

Pos. W. 2. Dist. W. 1.

Smyth says:—"It is a difficult object to manage, from the brightness of A."

5 *Aquilæ* (p. 427).

AC. Pos. W. 1. Dist. W. 1.

R. A. S. MS. has:—"C is very minute, so that its place is only *estimated* for placing it."

25 M. *Sagittarii* (p. 420).

Pos. W. 1. Dist. W. 1.

Mr. Burnham's difficulty in identifying the pair is possibly explained in R. A. S. MS. which says :—"A knot of from 10th to 13th mag. stars are *between* two stars of 8th. This is the position fixed." Note in MS. says :—"See Blue Book, p. 55, for description and position, &c." The diagram in MS. does not accord with the Cycle position-angle.

110 *Herculis* (p. 428).

Pos. W. 1. Dist. W. 1.

Smyth says :—"The acolyte was caught by gleams on steady gazing in a darkened field; it is certainly a *minimum visibile* in my telescope. The details are of course but *mere estimations*."

P. XVIII. 197 (p. 430).

Pos. W. 3. Dist. W. 1.

ν^1 *Lyræ* (p. 432).

AB.	Pos. W. 2.	Dist. W. 1.
AC.	„ W. 8.	„ W. 8.
CD.	„ W. 1.	„ W. 1.

R. A. S. MS. says :—"Δ A.R. AC=$3^s{\cdot}2$." This with W. 8 is rather inexplicable.

Cycle gives :—"As B and D are too small to bear any illumination the places above given are mere, though careful, *estimations*."

β *Lyræ* (p. 433).

AB.	Pos. W. 9.	Dist. W. 9.
AC.	„ W. 2.	„ W. 1.
AD.	„ W. 1.	„ W. 1.

Mr. Burnham states that this star is inserted "as an illustration of the *apparent accuracy* of the measures of Smyth when the star had been previously observed. The other companions, C and D, had not been measured at this time by other observers." As a matter of fact, the measures of C and D have W. 1, and were therefore not intended to be considered as accurate measures.

2024 H. *Aquilæ* (p. 437).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says :—"During the measures a bright Aurora Borealis."

γ *Lyræ* (p. 439).

Pos. W. 1. Dist. Δ A.R. W. 1.

P. XVIII. 299 (p. 440).

Pos. W. 1. Dist. W. 1.

Smyth says :—"The acolyte is of course too minute to admit of illumination, and its place is therefore *merely estimated.*"

ζ *Aquilæ* (p. 441).

Pos. W. 1. Dist. Δ A.R. W. 1.

Smyth says :—"As the comes defies illumination, the position is inferred by pointing the double image of A in the rock-crystal micrometer to the direction of B."

δ *Draconis* (p. 445).

Pos. W. 1. Dist. Δ A.R. W. 1.

δ *Aquilæ* (p. 446).

Pos. W. 1. Dist. W. 1.

Smyth says :—"The position and distance were obtained by *estimations* made in a dark field for the angle, and the Δ A.R. by a bar for the distance."

R. A. S. MS. gives Dist. Δ A.R. $=6^{s}\cdot6=96''\cdot50$

56 *Aquilæ* (p. 462).

Pos. W. 4. Dist. W. 1.

Smyth says :—"The angle of position was readily obtained (W. 4), but the distance is a mere estimation (W. 1) by Δ A.R. over a small bar in the eyepiece expressly fitted for such cases."

β *Aquilæ* (p. 464).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. gives Dist. ="Δ A·R.$=3^{s}\cdot7=175''\cdot0$."

γ *Aquilæ* (p. 455).

Pos. W. 1. Dist. W. 1.

α^{1} *Capricorni* (p. 472).

B*b*. Pos. W. 3. Dist. W. 1.

A*a*. ,, W. 2. ,, W. 1.

There is a strange and unexplained difference in the accuracy of the distances B*b* and A*a*, both having the same W. 1.

M. 29 *Cygni* (p. 478).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says :—"Dist. Δ A.R. of A and B about $4^{s}\cdot9$."

1 *Aquarii* (p. 483).

AB. Pos. W. 1. Dist. W. 1 (in R. A. S. MS.).

AC. „ W. 1. „ no weight given.

α *Delphini* (p. 483).

Pos. W. 1. Dist. W. 1.

α *Cygni* (p. 485).

Pos. W. 1. Dist. W. 1.

η *Cephei* (p. 488).

Pos. W. 1. Dist. W. 1.

χ *Delphini* (p. 490).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. has :—"The position and distance of A and B are by comparative *estimations*." Position is given "20°59′ (by crystal)."

59 *Cygni* (p. 492).

Pos. W. 2. Dist. W. 1.

R. A. S. MS. has :—"The colours were proved for me by Mr. Challis."

ζ *Cygni* (p. 497).

Pos. W. 1. Dist. W. 1.

Smyth probably measured distance with micrometer, for R. A. S. MS. gives distance="104″·79=150″·0."

α *Cephei* (p. 499).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. gives distance "Δ A.R.=9^s·8 W. 1 ; 8^s·8 W. 2." The small star is called "pale blue," not "pale sapphire."

β *Aquarii* (p. 502).

Pos. W. 2. Dist. W. 1.

Cycle says :—"This is a most difficult object, and one requiring the utmost delicacy of treatment to procure even an estimation of."

R. A. S. MS. says :—"The angle of position by the spherical crystal micrometer, and the distance an *estimation or comparison*," adding "$\mathrm{H}\frac{1}{8}$'s is certainly too wide."

We have here an instance to prove that Smyth's judgment was faulty ; Mr. Burnham has proved that $\mathrm{H}\frac{1}{8}$'s measure was very slightly in error.

ϵ *Pegasi* (p. 507).

AB.	Pos.	W. 1.	Dist.	W. 1.
AC.	,,	W. 8.	,,	W. 8.

P. XXI. 312 (p. 509).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says:—"Measurement was out of the question, the angle and distance are therefore by careful *estimation*."

20 *Pegasi* (p. 509).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says:—"Position and distance are *mere estimations*."

α *Aquarii* (p. 510).

Pos. W. 1. Dist. W. 1.

π^1 *Pegasi* (p. 512).

AB.	Pos.	W. 3.	Dist.	W. 2.
AC.	,,	W. 3.	,,	W. 1.

2 *Lacertæ* (p. 515).

Pos. W. 1. Dist. W. 1.

Smyth says:—"The *estimations* were carefully made."

ζ *Pegasi* (p. 520).

Post. W. 1. Dist. W. 1.

It is not easy to reconcile Smyth's position 15°·5 with Mr. Burnham's 137°·8. 15°·5 in the spherical crystal micrometer corresponds to an angle of 164°·5.

ξ *Pegasi* (p. 522).

AB.	Pos.	W. 1.	Dist.	W. 1.
AC.	,,	W. 2.	,,	W. 1.

Cycle says:—"B only to be caught under intense gazing with the most favourable circumstances of atmosphere and instrument. I added C for identification."

β *Pegasi* (p. 527).

Pos. W. 1. Dist. W. 1.

R. A. S. MS. says:—"B is readily seen at intervals."

4 *Cassiopeæ* (p. 534).

AB.	Pos. W. 6.	Dist. W. 2.
AC.	,, W. 2.	,, W. 1.
CD.	,, W. 1.	,, W. 1.

R. A. S. MS. gives distance "Δ A.R. A and C=25^{s}·3, A and B= 7^{s}·4. The companion of C is very faint at times."

The great discrepancy in the position-angle CD is not explained.

ι *Piscium* (p. 536).

	Pos. W. 1.	Dist. W. 1.

R. A. S. MS. gives:—"Position 140°·30=39°·30; Δ A.R. 10^{s}=199″."

This position is 180° − 140° 30′.

See remarks on spherical crystal micrometer.

κ *Andromedæ* (p. 536).

AB.	Pos. W. 1.	Dist. W. 1.
AC.	,, W. 2.	,, W. 1.

Cycle says:—"The *estimations* here given may at best be only ranked as *comparative guesses.*"

R. A. S. MS. says:—"Principally guesses."

P. XXIII. 171 (p. 537).

AB.	Pos. W. 3.	Dist. W. 1.
AC.	,, W. 1.	,, W. 1.

R. A. S. MS. gives "Distance Δ A.R. 8^{s}·4 A and C."

Bocking, Braintree,
1880, *June.*

On the Variability of B.A.C. 2472. By W. S. Franks, Esq.

In the May Number of the *Monthly Notices*, Mr. Tebbutt calls attention to the magnitude of this star, which is P vii. 114. On referring to my note-book, I find that it was observed on January 28, 1878, and there estimated as of the seventh magnitude. It is marked eighth magnitude in the large maps of the S.D.U.K.; but it is not contained in the *Uranometria Nova* of Argelander.

Leicester,
1880, *June* 10.